1.0 Characterization of the Watershed

1.1 Location & Description

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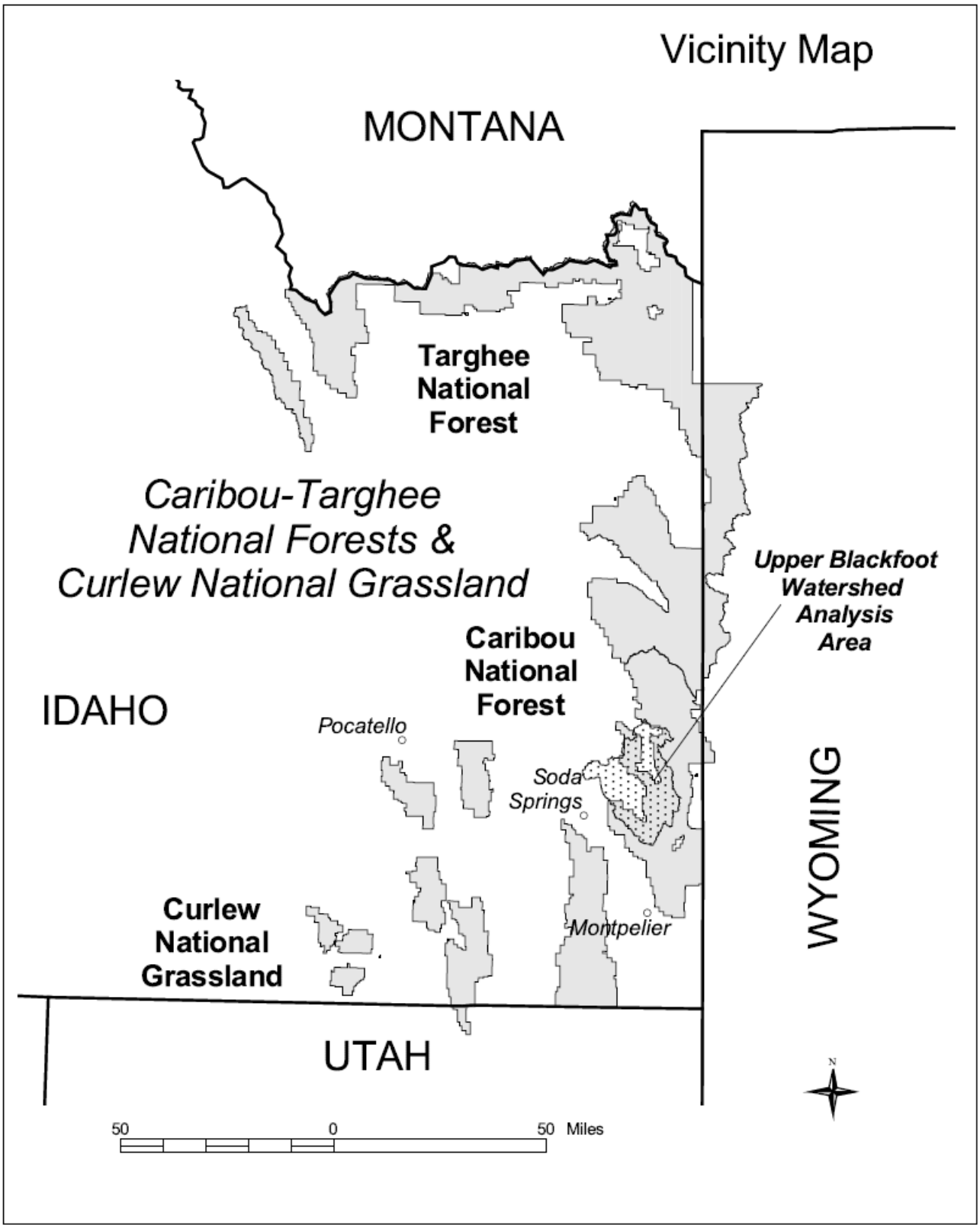
The Upper Blackfoot Watershed (UBW) is a 233,211 acre area draining into Blackfoot Reservoir in the Caribou Highlands of Southeast Idaho (See **Figure 1.1-1** and **Map 1 in Appendix A**). It comprises the eastern third of USGS 4th order Hydrologic Unit Code (HUC-4) subbasin (17040207) that drains into the Snake River Basin. The UBW encompasses 2 of the 6 - 5th level HUCs within the Subbasin. The 5th level HUCs are further divided into Sub-watersheds using the USGS 6th level HUCs. Refer to **Table 1.1-1**, **Figure 1.1-1**, and **Map 1 in Appendix A**. The watershed is entirely within Caribou County and is about 7 miles east and northeast of Soda Springs, Idaho. The topography is dominated by a series of northwestern trending ridgelines and valleys. The western edge is formed by the Aspen Range and the eastern side by the Webster Range. Noteworthy features within the watershed include (west to east) Schmid Ridge, Wooley Range, Dry Ridge, Rasmussen Ridge, and Upper Valley. The Lander Cutoff of the Historic Oregon Trail crosses the northern edge of the watershed. Several current and former open-pit phosphate mines are situated throughout the watershed.

Table 1.1-1: Watersheds (HUC 5) and Sub Watersheds (HUC 6) Name, Number and Acres. Named drainages are shown in brackets within the Subwatershed column.

Watershed (HUC 5)	Sub Watershed (HUC 6)	HUC 6 Number	Acres
Lanes Creek-Diamond Creek (1704020701) **(north/eastern third of watershed)**	Upper Lanes Creek [Chippy Cr, Lander Cr, Lanes Cr, Olsen Cr]	170402070101	18,275
	Lower Lanes Creek [Bacon Cr, Browns Cyn, Corrailsen Cr, Daves Cr, Sheep Cr, Lanes Cr]	170402070102	26,865
	Diamond Creek Headwaters [Middle Diamond Cr, Stewart Cyn, Timber Cr,]	170402070103	13,474
	Diamond Creek [Lower Diamond Cr, Bear Cyn, Cabin Cr, Campbell Cyn, Coyote Cr, Hornet Cyn, Kendall Cyn, Yellowjacket Cr, Terrace Cr, Timothy Cr]	170402070104	25,214
		Sub Total	***83,828***
Upper Blackfoot River (1704020702)	Slug Creek Headwaters [Upper Slug Cr, Cold Spring Cr, Wilde Cyn]	170402070201	11,545
	Upper Slug Creek [Middle Slug Cr, Dry Cyn]	170402070202	11,750
	Goodheart Creek-Middle Slug Creek [Goodheart Creek-Middle Slug Creek]	170402070203	14,578

	Johnson Creek [Johnson Cr, Burchertt Cr, Dry Fork]	170402070204	14,117
	Angus Creek-Blackfoot River [Angus Cr, Rasmussen Cr, East Mill Cyn, Mill Cyn, Blackfoot R]	170402070205	19,167
	Dry Valley Creek [Dry Valley Cr, Chicken Cr, Maybe Cr]	170402070206	15,192
	Lower Slug Creek-Blackfoot River [Lower Slug Cr-Blackfoot R, Caldwell Cyn]	170402070207	9,932
	Wooley Valley [Wooley Valley Cr]	170402070208	10,323
	Trail Creek-Blackfoot River [Trail Cr,-Blackfoot R]	170402070209	15,867
	Mouth of Blackfoot River [Reservoir inlet - Blackfoot River, State Land Cr]	170402070210	16,913
		Sub Total	***139,383***
Grand Total			**223,211**

Figure 1.1-1: Upper Blackfoot Vicinity Map



1.2 Land Ownership & Administration

The Caribou-Targhee National Forest manages most of the watershed, but other land ownership is involved. Approximate acres by jurisdiction are displayed in **Table 1.2-1** below.

Table 1.2-1: Jurisdiction within the Upper Blackfoot Watershed Analysis Area

Ownership	Acres	Percent of Analysis Area
B.L.M.	7,202	3.2%
Forest Service	123,026	55.1%
Open water	132	0.1%
Private	80,194	35.9%
State of Idaho	12,656	5.7%
Total	**223,211**	**100.0%**

Note: Ownership acres come from a combination of FS ownership GIS coverages, "cnf_owners05" and ownership outside the Forest boundary "id_ownblm." Acres are approximate.

Watershed Names and Numbers		Ownership					
HUC 5	HUC 6	B.L.M.	Forest Service	Open water	Private	State of Idaho	Grand Total
Lanes Creek-Diamond Creek (1704020701)	170402070101	270	6,988		9,982	1,035	18,275
	170402070102	1,323	16,196		8,501	845	26,865
	170402070103		13,474				13,474
	170402070104	34	21,081		3,483	615	25,214
	Sub Total	***1,627***	***57,740***		***21,966***	***2,495***	***83,828***
Upper Blackfoot River (1704020702)	170402070201		11,545				11,545
	170402070202	44	10,391		667	647	11,750
	170402070203	2,411	8,866		2,737	563	14,578
	170402070204		11,683		2,240	194	14,117
	170402070205	327	12,734		4,554	1,552	19,167
	170402070206	715	7,625		5,812	1,040	15,192
	170402070207	545			8,322	1,065	9,932
	170402070208	436	668	22	8,554	643	10,323
	170402070209	419	1,774		11,516	2,159	15,867
	170402070210	679		110	13,827	2,298	16,913
	Sub Total	***5,575***	***65,287***	***132***	***58,228***	***10,161***	***139,383***
	Grand Total	**7,202**	**123,026**	**132**	**80,194**	**12,656**	**223,211**

1.3 Hydrologic and Stream Processes

Climate

The weather station at Henry, Idaho at 6,132 ft is six miles to the north of the reservoir inlet and has longest continuous record in the immediate area, see **Table 1.3-1**. It has an average maximum daily temperature of 54 degrees Fahrenheit (F), and an average daily minimum of 24 F. The average precipitation at that station is 21 inches with about half falling as snow. Maximum storm precipitation rates are 0.8 to 0.9 inches for the 2yr, 6hr storm, and 2.8 to 3.0 inches for the 100yr, 24hr storm (NOAA, 1973), being lowest at the outlet and highest along Dry Ridge in the southeastern margin of the watershed. **Table 1.3-2** displays SnoTel data from a site at the southern end of the watershed at the Slug Creek Divide near Summit View Campground.

Table 1.3-1: NWS Weather Data - Henry, Idaho (104230)

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	27.3	33.5	40.4	51.7	61.5	71.7	80.2	79.1	69.3	56.2	39.8	30.9	53.5
Average Min. Temperature (F)	4.5	6.5	14.2	23.0	33.1	39.6	43.5	41.8	34.2	26.1	15.5	8.0	24.2
Average Total Precipitation (in.)	1.95	1.72	1.64	1.03	2.51	1.41	1.59	1.42	1.67	1.72	1.80	2.13	20.59
Average Total Snowfall (in.)	17.7	15.2	9.4	4.0	1.3	0.1	0.0	0.0	0.3	2.3	13.6	16.1	80.2
Average Snow Depth (in.)	28	33	24	8	0	0	0	0	0	0	3	16	9
Period of Record Monthly Climate Summary: 9/23/1971 to 6/30/2005. Percent of possible observations for period of record: Max. Temp.: 85.9% Min. Temp.: 83.1% Precipitation: 89% Snowfall: 82.2% Snow Depth: 82.9%													

Table 1.3-2: NRCS SnoTel Precipitation Data – Slug Creek Divide, Idaho (11G05)

Parameter	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Sum
Ave. Snow Water Content (in.)	N/A	N/A	N/A	6.6	11.2	14.9	18.1	11.9	0.1	N/A	N/A	N/A	N/A
Ave. Precipitation (in.)	2.3	3.6	4.2	3.7	3.2	3.2	2.9	3.1	1.7	1.2	1.3	1.8	32.1
Period of Record Monthly Climate Summary: 10/1/81 to 9/30/2006 Snow Water Equivalents are from first of month measurements													

Hydrologic Unit Code Divisions

The Hydrologic Unit Code (HUC) system was developed by the USGS in the 1990s to organize and identify watershed areas by a hierarchical numbered code system. More numbers in the code equal smaller subdivision. The entire Blackfoot River, 2/3 of which is below the reservoir and outside the watershed assessment area, is the 4th order (subbasin) watershed 17040207.
The watershed analysis area is comprised of two 5th order watersheds, 1704020702 (Lanes Creek-Diamond Creek) and 1704020703 (Upper Blackfoot River) containing fourteen 6th order subwatershed (HUC6) **Table 1.1-1**.

The watershed boundaries have recently been updated from a 1:100,000 to a 1:24,000 scale to comply with National Map Accuracy Standard and Protocol. Originally the Upper Blackfoot Watershed area was subdivided into four 5th order watersheds and through accuracy protocol updates the watershed area has been consolidated down to two 5th order watersheds. The boundaries of the smaller 6th order sub-watersheds were also changed, some consolidated, a few subdivided differently so that there is not a one-to-one correspondence. **Table 1.3-3** shows a cross-walk between the "old" and "new" HUC-6s.

Table 1.3-3: New and Old Watershed (HUC-6) Numbers.

"New" HUC-6	"Old" HUC-6	Area
170402070101	170402071106, 170402071107	Upper Lanes Cr
170402070102	170402071103, 170402071104 170402071105	Lower Lanes Cr
170402070103	170402071202, 170402071203	Upper Diamond Cr
170402070104	170402071104, 170402071201, 170402071202	Lower Diamond Cr.
170402070201	170402071304	Upper Slug Cr
170402070202	170402071303	Upper-Middle Slug Cr
170402070203	170402071303	Lower-Middle Slug Creek
170402070204	170402071302, 160102010304	Johnson Cr.
170402070205	170402071101, 170402071104	Uppermost Blackfoot R
170402070206	170402071102, 170402071202	Dry Valley Cr
170402070207	170402071301, 170402071301	Lower Slug Cr.
170402070208	170402071002, 170402071004	Wooley Valley
170402070209	170402071002, 170402071003	Trail Cr
170402070210	170402071001, 170402071002, 170402070802	Blackfoot River

Stream System and Processes

The Blackfoot river above Blackfoot reservoir is primarily fed by three tributaries: the south flowing Lanes Creek and northwest flowing Diamond Creek in Upper Valley in the northern and upstream portion of the watershed, and northwest flowing Slug Creek in Lower Valley joining the river below the Narrows. This analysis does not include the Little Blackfoot or the Clarks Cut connection to Grays Lake. The Blackfoot name first applies where Diamond Creek joins with

Lanes Creek. A number of smaller tributaries join directly to the river, including Angus Creek, Sheep Creek and Dry Valley Creek. The Upper Blackfoot Watershed Analysis area contains 313 miles of perennial stream and 507 miles of intermittent stream as shown in **Table 1.3-4**. A large portion of the perennial miles are located on private as these lands are located in the valley bottom and the lower portion of the watershed. The Forest Service manages the a majority of the headwaters to many of the stream systems in the watershed which correlates directly with the larger miles of intermittent stream found on Forest Service ownership.

Table 1.3-4: Perennial and Intermittent Stream Miles within the Upper Blackfoot Watershed Analysis area.

Ownership	Stream Miles	
	Perennial	Intermittent
B.L.M.	3.4	15.2
Forest Service	90.4	284.9
Private	204.0	178.6
State of Idaho	14.8	28.3
Total	312.6	507.0

Many of the natural tributaries in upstream areas lose some or all of their surface flow to the subsurface in some reaches. This includes the larger tributaries of Diamond Creek and Slug Creek, as well as many tributaries to these two creeks. A driving force to the large subsurface flow component is the Northwest/southeast to north-south trending geologic thrust faults, associated conjugate faulting and many prominent fracture sets in the bedrock. The fractures in the abundant carbonate bedrock formations are believed to have been enlarged by infiltration of carbon dioxide enriched rainwater to form some karst "piping" of subsurface waters. Irrigation diversions to agricultural lands in the area also reduce or eliminate surface water flows.

Watershed Geomorphology

The terrain of the watershed is dominated by a series of carbonate and sedimentary bedrock formations folded into long ridges and valleys along generally northwest trending axes. The folding produced thrust faults and major fractures mostly along these same axes, which affect both the surface and subsurface flow patterns. Most of the watershed exhibits a trellis drainage pattern. Channels of the larger tributary streams in the broad valley bottoms (Slug Cr, Diamond Cr, Lanes Cr, etc.) are relatively low-gradient and are more sensitive to disturbance due to fine-grained materials that form banks. Most small tributary streams have steeper gradients and banks/bed have cobble or other energy dissipators to make them much more resistant to disturbance. Lowest reaches of many of the smaller tributary streams are transitional, with fine grained banks that are sensitive to disturbance.

Surface Water Quantity and Timing

Snowmelt runoff generally produces annual peak flows in the mainstem and tributaries. Runoff events producing the major flood peaks on smaller tributaries frequently result from late summer storms, (usually referred to as "monsoons" in the southwestern U.S.) which bring intense, short-to moderate duration rains. At the mid to lower elevations, partial snowmelt events can occur in late fall, winter and early spring. Some high peaks can result from these quickly melting snow or rain-on-snow events, particularly if substantial late fall or early winter cold weather before snows arrive has caused the ground to freeze. Frozen ground conditions can cause drastic increases in runoff volume for relatively short periods of time. Annual snowmelt peak runoffs on tributary streams generally occur from early April to June, depending on spring weather patterns and elevation. Peak daily flow at the "Blackfoot River above Reservoir near Henry ID" USGS Gage 13063000 during the period of record of record, 1914-25, 1968-82 & 2001-06 generally occurs from mid April to mid May. Recorded peak flows are actually mean daily average flows during most of the period 1914-25. The largest flow of record was 21,506 cfs on April 26, 1974. About 95 percent of the watershed analysis area is included in the drainage area of that USGS stream gage. After peak spring flow, streamflows generally subside to baseflow conditions by the end of July, lasting to March. Many small tributary streams not fed by springs and seeps are dry during most of the baseflow period. Consumptive water rights use flows for crop irrigation in the larger valleys during the growing season.

Surface Water Quality

Surface water quality is variable due to a variety of factors, many of which are not uniform within the watershed. There are two prominent known water quality issues, non-acid mine drainage from mine waste dumps, and sediment from a variety of other sources. Major sediment sources include native surfaced roads and motorized trails near streams, eroding streambanks, gullies and riparian areas lacking sufficient or proper ground cover. The principal mine drainage contaminant is the element Selenium, which is essential to life in trace amounts, but is judged to be harmful to some fish over the long term at 5 parts per billion (approximately 0.005 mg/L) as indicated by the state cold water biota chronic criterion for selenium (IDEQ 2008b). Removal of willows or other streamside woody vegetation in many of the larger valley bottoms has reduced stream shading and bank stability is likely to have played a role in channel widening and braiding in the large valley bottoms. Channel widening is a source of sediment and also causes increases in water temperatures. Historic intensive grazing has depleted water-absorbent upper soil horizons in some areas. Intense rain events on these areas can cause significant erosion with little or no current human or additional natural disturbance. Carbonate rock is near the surface or underlies of the watershed, therefore baseflows in streams are usually well buffered from that source and have pH values of 7.8 to 8.5.

Groundwater

Data on the groundwater levels is available from the Idaho Department of Water Resources (IDWR) in well drilling reports. There are three general subsurface water flow systems, regional (groundwater flow measured in miles laterally and hundreds to thousands of feet vertically), intermediate (upper layer of groundwater flow but within a mile or so or so laterally and variable vertically) and local, which is perched water over the groundwater system which may or may not be connected to the larger systems. Connection between systems may hydrologic, but not hydraulic some or most of the time. The watershed is underlain by a deep, regional groundwater flow system consisting of the highly permeable Wells Limestone (about 2,000 feet thick near Rasmussen Ridge), with flow in most of the upper watershed in that system being generally to the north. General flow patterns in bedrock are modified by vertical faulting, with flow near faults generally greater than un-faulted areas by a factor of 5 to 100 parallel to the fault and one fifth to one hundredth across the fault (i.e. groundwater generally runs along faults rather than across them). These faults are generally perpendicular to ridgelines, an example being the Blackfoot Tear Fault, which is at the north end of the Dry Valley Mine. An intermediate scale component (between regional and local) is the mostly water bearing Thayne Formation (about 2,200-2,800 feet thick near Rasmussen Ridge), which is understood to have a much slower rate of flow (e.g. lower transmissivity) than the Wells Formation. Localized groundwater flow in overlying subsurface layers is controlled by a variety of factors. Several of these are: surficial alluvial deposits, carbonate-matrix geologic formations, non-carbonate-matrix geologic formations, bedding planes and fold patterns, thrust, block, and tear faults, and fracture systems. Alluvial deposits tend to form aquifers in the broad valley bottoms which are understood to be generally well connected hydrologically to the streams, with no apparent confined subsurface conditions or flow patterns. The Rex Chert (about 100-200 feet thick) is the most prominent ridge-former and with portions of the underlying Phosphoria and Dinwoody Formations, are less permeable and can reduce or restrict water flow where they occur.

Beneficial Uses

Most perennial streams with baseflow sufficient to support salmonid fish (greater than about 1 cfs) have been judged to be capable of supporting the Cold Water Biota beneficial use by DEQ. The Blackfoot River and most major tributaries have also been rated as capable of supporting secondary contact recreation, a few also have been found capable of primary contact recreation. Beneficial uses for agricultural water supply, industrial water supply, wildlife habitat and for aesthetics apply to all surface waters of the state. Detailed data for beneficial uses in the watershed are given in Chapter 3.

Wetlands and Springs

A total of 50 springs have been mapped by the USGS on 1:24,000 scale topographic maps within the Forest boundary; however the mapping of springs is known to be notably incomplete, with many other springs being present. The National Wetlands Inventory mapping project of the U.S. Fish and Wildlife Agency has identified a total of 1,560 acres of wetlands in 465 individual units (after subdivision by HUC-6 boundaries) within the Forest perimeter. Of these acres, 927.9 are palustrine emergent, 571.7 are palustrine shrub, 58.2 are palustrine unconsolidated bottom, 1.6 are palustrine forested, and 0.7 acre is palustrine shrub with unconsolidated bottom. Mapped wetlands and springs are in **Table 1.3-5**.

Table 1.3-5: NWI Mapped Wetlands and Springs on Forest

HUC-6	Springs	Wetland units	Wetland acres
170402070101	1	11	14.4
170402070102	2	22	57.7
170402070103	2	32	194.8
170402070104	10	66	330.9
170402070201	5	53	192.0
170402070202	2	51	148.4
170402070203	3	21	124.5
170402070204	5	36	74.4
170402070205	10	139	344.3
170402070206	5	21	64.0
170402070207	0	0	0
170402070208	0	0	0
170402070209	5	13	14.7
170402070210	0	0	0
Grand Total	50	465	1560.1

1.4 Geology, Soils & Landtype Association

Geology

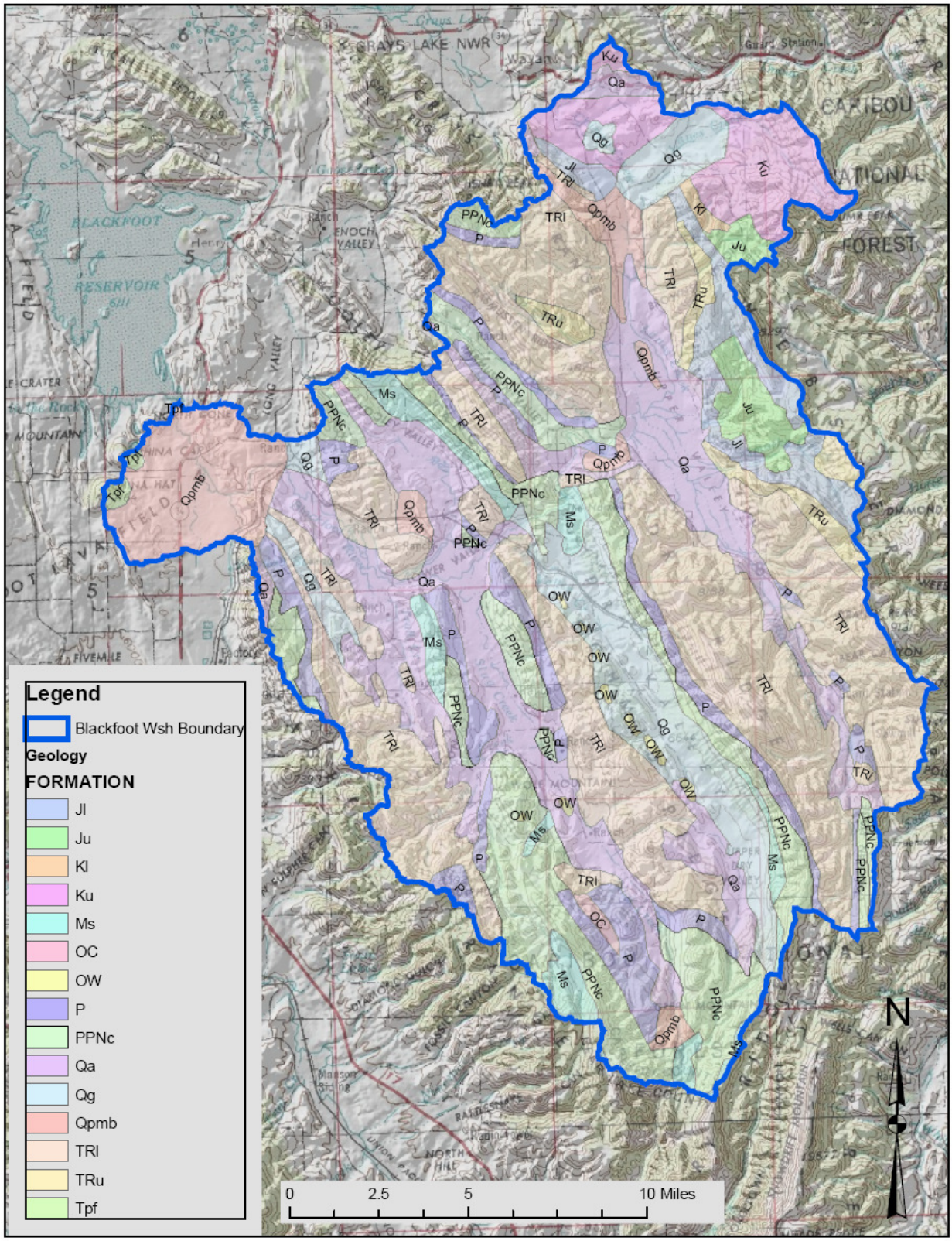
The general area is located within the Wyoming Thrust Belt portion of the overthrust belt, a very large geologic structure/province extending from Alaska to Mexico. The Wyoming Thrust Belt is a salient in that geologic structure that includes much of southeast Idaho and extends into western Wyoming and northern Utah. The existing structural geology in the thrust belt was essentially created by compressional forces that formed numerous folds and faults, including thrust faults. The folded and faulted rock layers were later over-printed by the development of Basin and Range type extensional forces that created high-angle normal faulting. The folded and faulted geologic structure has formed mountain ranges that follow the structural trend, generally in a northwest – southeast direction in this area.

Rock units present in the area consist primarily of marine sedimentary rocks, ranging in age from Mississippian through Cretaceous, with most being Mesozoic in age. Most of these sedimentary rocks consist of limestone, shale, sandstone, or mudstone. Other Cretaceous rocks of a terrestrial origin (sandstone, conglomerate, and mudstone) are abundant in the northern part of the watershed analysis area. Quaternary-Tertiary basalt flows are also present in the watershed. Abundant alluvial and fluvial deposits (sand, silt, and gravel) are generally present in the valley floors (Mitchell and Bennett, 1979). The commercially important Phosphoria formation is also present near the surface in several places throughout the watershed. Geological information illustrated below in **Figure 1.4-1** and **Table 1.4-1** was collected from a USGS publication map (USGS 1996, personal comm. Steve Robinson).

Table 1.4-1 Upper Blackfoot Geology Formation Names (USGS 1996, pers. comm. Steve Robison)

Formation Code	Formation Name	Acres
Jl	Jurassic Lower (prob includes Twin Cr limestone and Nugget sandstone)	7291
Ju	Jurassic Upper (prob includes Stump sandstone and Pruess sandstone)	4143
Kl	Cretaceous Lower (prob includes Gannett Group)	459
Ku	Cretaceous Upper (prob includes Wayan formation and Sage Junction formation)	9961
Ms	Mississippian formation (probably limestone)	7145
OC	Ordovician-Cambrian	433
OW	Ordovician-Cambrian	601
P	Permian (prob including Phosphoria)	16189
PPNc	Pennsylvannian-Permian (probably Wells formation and Phosphoria formation)	30543
Qa	Quaternary alluvium	39461
Qg	Quaternary glacial deposits	18067
Qpmb	Quaternary basalt	14370
Tpf	Tertiary (prob pyroclastic flow)	465
TRl	Triassic Lower (prob includes Timothy sandstone, Thaynes formations and Woodside shale)	69619
TRu	Triassic Upper (prob includes Woodside shale, Deadmand limestone, Higham grit and Arkarah formation)	4471

Figure 1.4-1: Upper Blackfoot Watershed Geology (USGS 1996).



Soil Resources

Soil Data Sources

- National Hierarchical Framework for Ecological Units. 1994. USDA Forest Service.
- A Hierarchical Stratification of Ecosystems of the Caribou National Forest. 1997. USDA Forest Service.
- Soil Survey of the Caribou National Forest. 1990. USDA Forest Service.

Overview

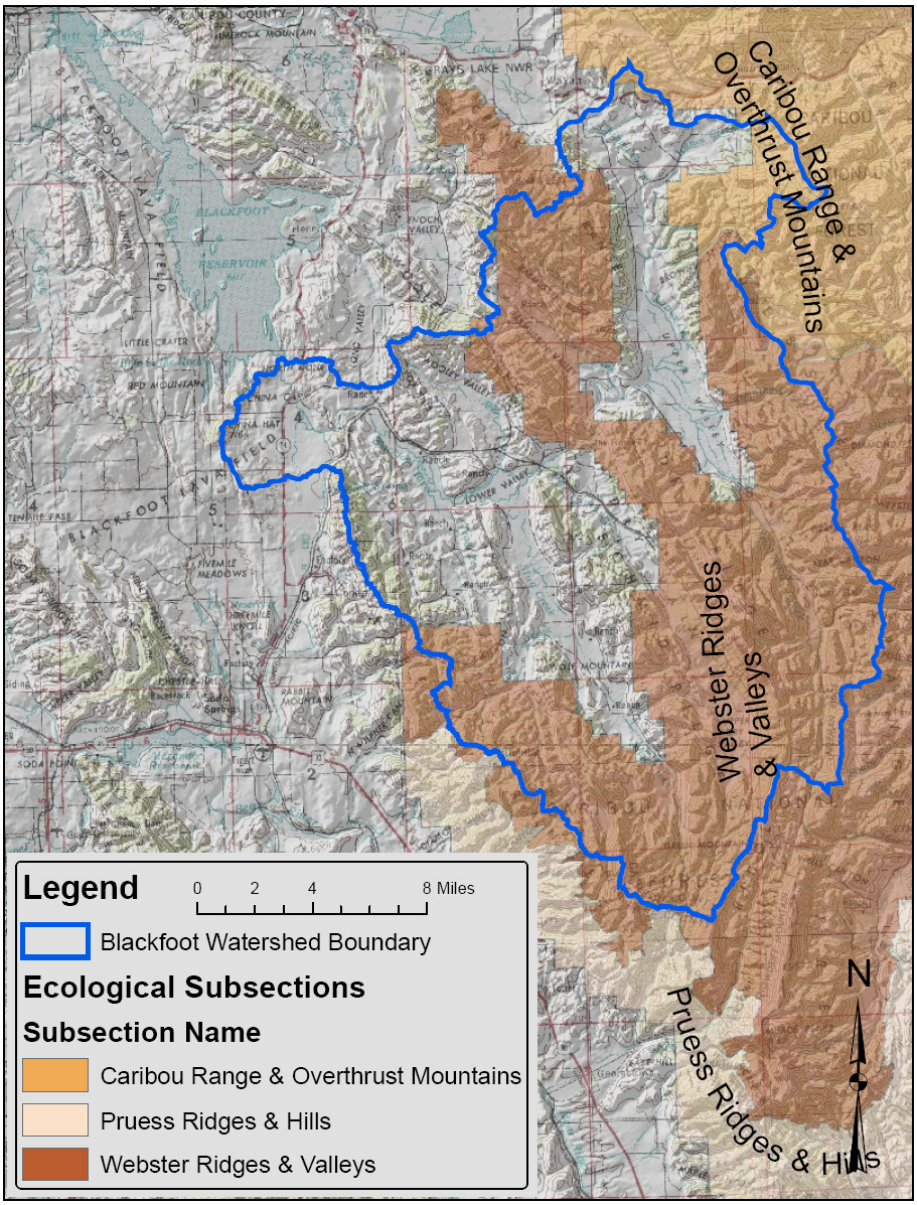
The soil resources in the Blackfoot watershed have developed on steep, block-faulted mountain slopes, windblown ridges, and long depositional valleys. Native vegetation on this mountainous landscape is primarily conifer and aspen forests and shrublands. Soil development on these landscape features varies according to the basic soil forming factors of parent material, climate (moisture and warmth increase weathering and the rate of soil development), biotic factors (such as vegetation type), topography (aspect affects soil development), and time. In this watershed, soils formed in sedimentary geology worked by geomorphic processes over time, with biotic and topographic factors influencing soil formation. For example, sagebrush on the shallower, drier, south-facing slopes with conifers and aspen occupying the deeper, moister soils on north-facing slopes.

Hierarchy of Ecological Units

Soil resources in the watershed are described in conjunction with geology and vegetation as ecological units at different scales as part of a hierarchy of ecological units. The Blackfoot watershed (223,211 acres; 55% National Forest System lands) is located primarily within the Webster Ridges and Valleys Ecological Subsection, with the northern corner within the Caribou Range and Overthrust Mountains Subsection outlined in the National Hierarchical Framework for Ecological Units (USDA Forest Service 1994). **Figure 1.4-2** illustrates the spatial extent of the ecological subsections on National Forest System lands in the Blackfoot watershed. The Webster Ridges and Valleys subsection concept is of ridges and valleys with slopes ranging from 15-65% of mainly sedimentary rocks. This includes Paleozoic to Mesozoic age limestones, siltstones, conglomerates, sandstones and cherts that have been worked by fluvial, residual, colluvial and gravitational forces. Natural disturbance processes in this Subsection are fire, periodic insect infestations, and windthrow. Human caused disturbances on the landscape include phosphate mining, logging, road building, recreation activities and domestic livestock grazing (USDA, 1997).

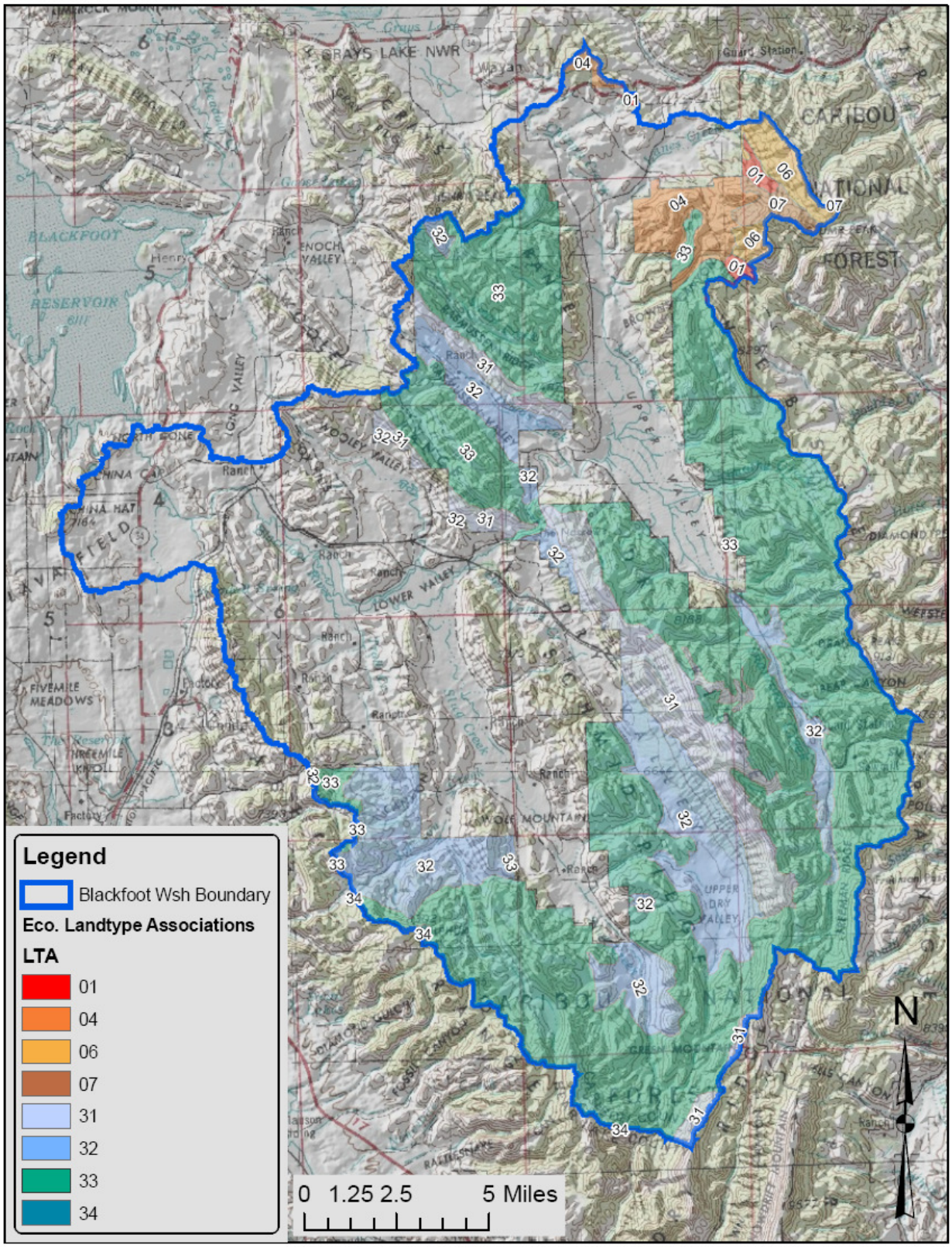
While the majority of the watershed is in the Webster Valleys and Ridges Subsection, the northern corner is in the Caribou Range and Overthrust Mountains Subsection. This Subsection concept is also of mountain ranges and valleys of Mesozoic and Cenozoic age sedimentary rocks such as limestone, siltstone, conglomerate and sandstone, but also includes intrusive metamorphic rocks. This geology has been modified by geomorphic processes such as fluvial processes in drainages, residual processes, and gravitational mass movement (USDA, 1997). The general slope range in this Subsection is 5-60%. Natural disturbances include fire, flooding in drainageways, insect and disease outbreaks in conifer stands, windthrow, and mass movement. Human -caused disturbances include road building, gold mining, dredging in some streams, logging and domestic livestock grazing. A full description of these subsections as well as the smaller-scale Landtype Associations can be found in “A Hierarchical Stratification of Ecosystems of the Caribou National Forest” (USDA-FS 1997).

Figure 1.4-2: Ecological Subsections mapped on National Forest System land in the Upper Blackfoot Watershed.



Ecological Landtype Associations are further delineated into ecological landtypes. A description and map of these landtypes is available in the Caribou Soil Survey (1990). For analysis at the watershed scale, however, the broader-scale ecological Landtype Associations will be discussed. No information is shown for private land. The NRCS is in the process of updating the Soil Survey of Caribou County, which addresses soil resources on private lands. Existing soil information was used in the NRCS Rapid Watershed Assessment (2007). This analysis of private lands was summarized in the Current Conditions Chapter 4.

Figure 1.4-3: Ecological Landtype Associations mapped on National Forest System lands in the Upper Blackfoot Watershed.



Webster Ridgelands and Escarpments/ Sagebrush-Alpine Rangeland (LTA 31)
This landtype association occurs on ridges and escarpments and supports primarily sagebrush and alpine rangeland. The elevation range is 6500 feet to 9960 feet and the slopes range from 30-70%. Soils depths vary from shallow to very deep, and are typically well drained. These landforms are stable, with a moderate to high erosion hazard and a sediment delivery potential of approximately 0.018 to 0.025 tons/acre/year (USDA Forest Service 1997). See
Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

Webster Bottomlands, Toeslopes and Foothills/ Sagebrush-Douglas fir-Subalpine fir (LTA 32)
The primary concept of this LTA is alluvium and colluvium in the valley bottoms, toeslopes and foothills supporting a mosaic of sagebrush and Douglas fir-Subalpine fir forest. Elevation ranges from 6300 to 8000 ft, and slopes range from 1-60%. Soil depths vary from shallow to very deep, and drainage also varies from poorly drained to well drained. Landforms are predominantly stable, with varying degrees of erosion hazard, and sediment delivery potential ranging from 0.008 to 0.03 tons/acre/year (USDA Forest Service 1997). See
Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

Webster Mountainsides, Canyons and Basins/ Alpine fir-Douglas fir-Mtn Mahogany-Sagebrush (LTA 33)
This LTA occurs on rugged mountains with narrow canyons and upland basins. Vegetation is a mosaic, with lodgepole pine and subalpine fir on the north-facing mountainsides and canyon walls and sagebrush and mountain brush occurring on south-facing mountainsides, canyon walls and basins. Elevations range from 6600 to 9960 ft and slopes range from 15-70%. Soils are well drained and typically shallow on the sideslopes and canyons and very deep in the basins. The landforms in this LTA are primarily stable, although some areas are marginally unstable, with a primarily moderate erosion hazard, and a sediment delivery potential ranging from 0.003 to 0.02 tons/acre/year (USDA Forest Service 1997). See
Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

Caribou Basins, Toeslopes and Fans/ Mountain big sagebrush-Lodgepole pine-Aspen (LTA 01)
This LTA consists of basins, toeslopes and alluvial fans in the Caribou Mountain Range supporting mountain big sagebrush communities on the basin floors and aspen/subalpine fir vegetation types on the foothills, fans and toeslopes. Elevation ranges from 6200 to 7600 ft, and slopes range from 5-35%. Soils are moderately deep to deep and are well drained. Landforms in this LTA are marginally stable to marginally unstable, and erosion hazards range from moderate to moderately high. Potential sediment delivery rates range from 0.008 to 0.01 tons/acre/year (USDA Forest Service 1997). See
Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

Tincup Unstable Foothills and Basins/ Alpine fir and Sagebrush (LTA 04)
Foothills and basins in the Caribou Mountains supporting Subalpine fir cover types on north and east facing slopes and Mountain big sagebrush cover types on south and west exposures comprise this LTA. Major geomorphic processes include thrust-faulting and slumping. Elevation ranges from 6200 to 8200 ft, and slopes range from 10-55%. These landforms are unstable, have a moderate to high inherent erosion hazard, and have a potential sediment delivery rate of 0.015 to 0.025 tons/acre/year (USDA Forest Service 1997). See

Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

Tincup Unstable Low Mountains and Broken Slopes/ Douglas fir-Aspen-Sagebrush (LTA 06)
This LTA is comprised of mountain and canyon slopes, low-relief mountains and broken, hummocky slopes in the Caribou Mountain range. This landscape supports a mosaic of coniferous forest, aspen and shrublands, with the conifer types dominating the north-facing slopes, mountain big sagebrush occurring on south and west facing slopes, and Aspen occupying deeper soils throughout the LTA. Elevation ranges from 6200 to 8000 ft and slopes range from 20-70%. Soils are moderately deep to deep and well drained. These landforms are unstable, have a moderate to high inherent erosion hazard, and a potential sediment delivery of about 0.01 to 0.035 tons/acre/year (USDA Forest Service 1997). See
Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

Elk Mountain Sideslopes and Ridgelands/ Alpine fir-Lodgepole pine and Sagebrush (LTA 07)
This LTA consists of mountains ridges and sideslopes in the Caribou Mountain Range supporting a mosaic of coniferous forest and shrublands, depending on the aspect. Elevations range from 6200 to 8200 ft and slopes range from 10-55%. Soil depths range from shallow to deep, and most soils are well drained to somewhat excessively drained. These landforms are unstable, have a moderate to high inherent erosion hazard, and a sediment delivery rate between 0.10 and 0.2 tons/acre/year (USDA Forest Service 1997). See
Figure 1.4-3 for spatial distribution within the Blackfoot watershed.

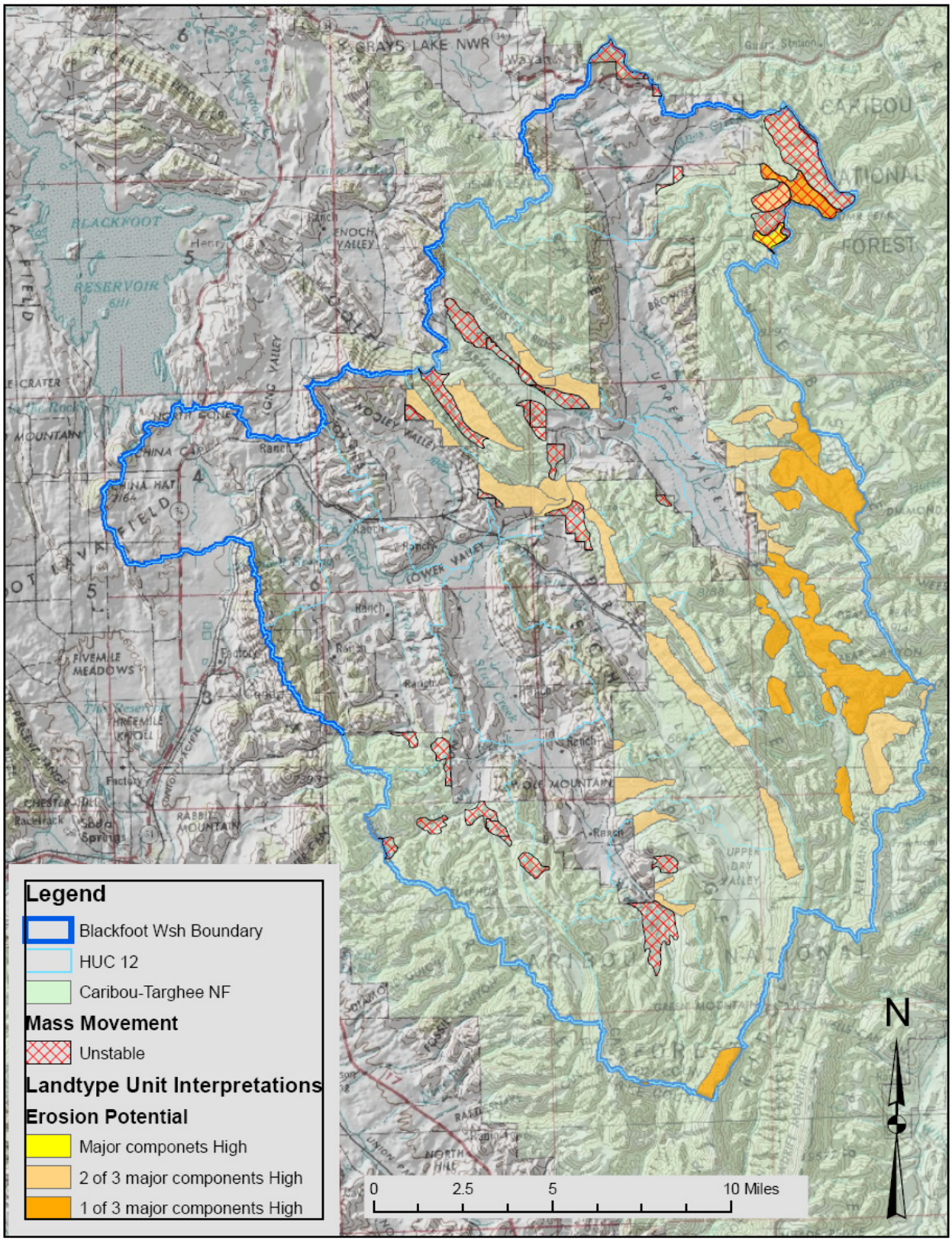
Riparian Soils

Riparian and hydric soils are present in the watershed along drainages, springs and wetlands. One ecological landtype (061-Venable Family-Argic cryaquoll-Coski Family complex 0-5% slopes) with wet soils is mapped in this basin. The scale of mapping left many small areas of riparian soils undifferentiated within larger ecological landtype map units, so the areas mapped 061 are not the entire extent of the riparian soils.

Mass Stability

Due to the thrust faulting, folding and other faulting of weak, soft sedimentary parent materials, there are unstable landforms present in the watershed. These unstable landforms are subject to mass wasting and landslides. Bedding planes that have been documented as being unstable include the Twin Creeks Formation, Preuss Formation and the Wells Formation (Olsen *et al*, 1970; and USDA, 1997). Indicators of slope instability are hummocky side slopes, with pistol-grip tree bases, and over-steepened slopes with evidence of old landslides or debris flows. Land Type Associations 01, 04, 06 and 07 have unstable landforms that are susceptible to mass movements. Approximately 8,460 acres (7%) of National Forest land in the Blackfoot watershed is unstable. **Figure 1.4-4** shows the areas in the watershed that have a higher potential for mass instability.

Figure 1.4-4: Inherent erosion hazard and mass movement potential for ecological landtypes mapped on National Forest System lands in the Blackfoot Watershed (USDA Forest Service 1997)



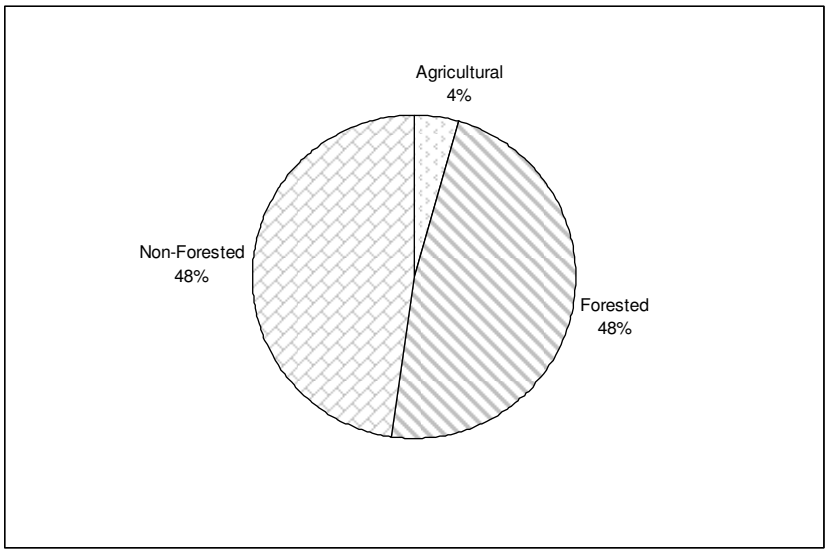
Inherent Erosion Hazard

Erosion is the detachment and transport of soil particles by wind, water or gravity and is a natural process that shapes the landscape (USDA Forest Service, Caribou NF, 1997). Four major factors that affect the erosion hazard of a particular site are soil texture, slope, amount of protective ground cover, and frequency and intensity of storm events. Geologic parent material affects soil texture; for example, soils weathered from shales, limestones, mudstones and siltstones tend to develop into clays and silts, which are easily eroded when the protective ground cover is removed. Steeper slopes tend to erode more easily than flat areas, but the amount of soil cover is also very important. Protective groundcover can vary based on the vegetative potential of the site. Naturally unproductive sites can have a higher rate of erosion due to less protective soil cover. If inherently erodible soil textures exist on steep slopes, management actions that disturb and reduce ground cover beyond the natural range of variability can increase erosion above natural rates and potentially cause long-term damage. The soils in the watershed most susceptible to erosion are those formed on steep slopes from erosive sandstone, siltstone or limestone geology. About 18,344 acres (15%) of National Forest lands within the watershed have an inherently higher erosion potential. **Figure 1.4-4** shows the areas in the watershed that have a higher potential erosion hazard.

1.5 Vegetation Dynamics

Three general vegetation classes and ten vegetation types have been used to characterize the vegetation within the watershed. The vegetation data used in this section is the result of combining two different vegetation data sets. Outside of the National Forest Boundary, a Forest Service broad scale classified satellite GIS (geographic information system) cover from 1998 was used. Within the National Forest Boundary, a Forest Service classified satellite GIS cover from 2001 was used. The vegetation within the analysis area was first characterized using three general vegetation community types, Agriculture, Forested, and Non-Forested **Table 1.5-1**. The Agriculture vegetation class was not divided down into vegetation types. The Forested vegetation class was divided into four cover types in order to further characterize the vegetation within the watershed. To characterize the Non-forested community type, five cover types have been used within the watershed. The following sections break each class down by vegetation type and ownership.

Figure 1.5-1: BWA Vegetation Classes



Agriculture

Approximately 4% of the analysis area can be characterized as agricultural vegetation. All of this vegetation/land use type is located off national forest land. The most distinguishing characteristic of this vegetation group is the obvious influence of human management. Vegetation composition and structure have been directly influenced by human activity every year since the area was settled.

Table 1.5-1: Jurisdictional break down of the agricultural and developed vegetation types.

Vegetation Type (% of analysis area)	Jurisdiction	Percent	Description
Agricultural (4%)	Non-Forest Service	4%	Consists of crops such as: alfalfa, barely and wheat as well as CRP (land set a side program administered by NRCS called Crop Reserve Program) and pasture.

Forest Vegetation

Approximately 48% of the analysis area can be characterized as forested vegetation (FV) and as typical for high elevation forest in the intermountain west. The Caribou National Forest manages approximately 81% of the acres that are classified as forested vegetation. For the purpose of analysis forested vegetation within the analysis area has been broken into four cover types; aspen, Douglas-fir, lodgepole, and mixed conifer.

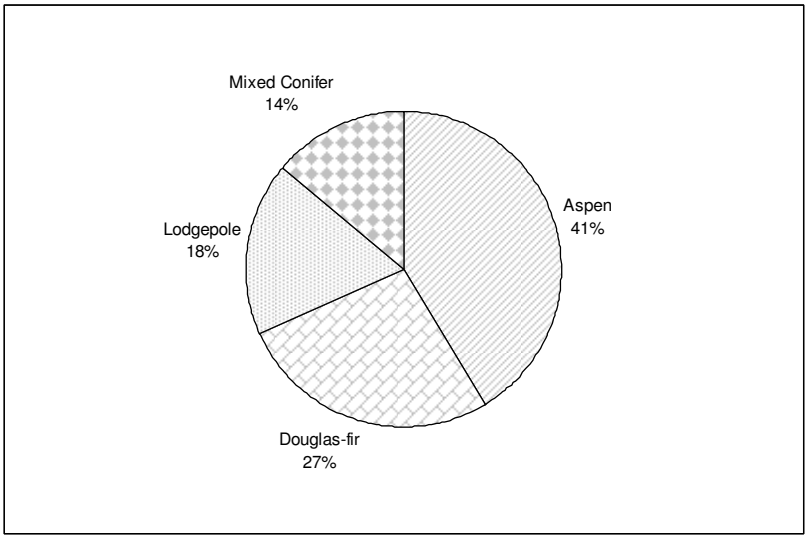


Figure 1.5-2: Forested Cover Types

Table 1.5-2 Forest cover types: For more general information on tree species/cover types see http://na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm

Cover Type (% of FV)	Jurisdiction	Description
Aspen (41%)	61% FS 39% Non FS	Quaking aspen is found throughout the analysis area. Aspen can vary from an early seral to persistent seral species. It can also occur as a climax species, occupying sites below the limit of conifers.
Douglas-fir (22%)	98% FS 2% Non FS	Rocky Mountain Douglas-fir is found throughout the analysis area. At the lower drier edge of its zone, it is confined to north slopes and shaded areas and is often the climax species for the site. At the higher levels, it can grow on any aspect including sunny rocky south and west exposures. On cooler moist sites it is an early seral species with subalpine fir and Engelmann spruce as climax species. Aspen is often an important early seral species in this type.
Lodgepole (18%)	95% FS 5% Non FS	Lodgepole pine is a pioneer species that requires a disturbance that exposes bare mineral soil to regenerate. In most stands in this type lodgepole is the seral species with subalpine fir being the climax species. However in other stands lodgepole can be considered as persistent seral due to the fire return interval. Aspen may be found as a minor component of the type.
Mixed Conifer (15%)	89% FS 11% Non FS	Stands that currently have a mix of conifer species or are currently dominated by subalpine fir have been included in this type. In this type subalpine fir is the dominant climax species with occasional Engelmann spruce. Aspen, lodgepole pine and Douglas-fir often occur in various ratios in the early seral stage.

FS = Forest Service

The Caribou National Forest Sub Regional Properly Functioning Condition (PFC) Assessment and the draft Forest Plan EIS state that at the forest level all of the forested cover types are out side of properly functioning and desired future conditions. The PFC assessment states that at the sub-regional scale the aspen, Douglas-fir and mixed conifer types are at high to moderate risk and that lodgepole is at low risk. The PFC document looked at structure, composition and disturbance regime to develop the ratings.

Non-Forested Vegetation

Approximately 48% of the analysis area can be characterized as non-forested vegetation (NFV). The Caribou National Forest manages approximately 35% of the acres that are classified as non-forested vegetation. For the purpose of analysis in this document non-forested vegetation has been broken into five cover type's sagebrush/grass, riparian/water, mountain brush, other, and mountain shrub.

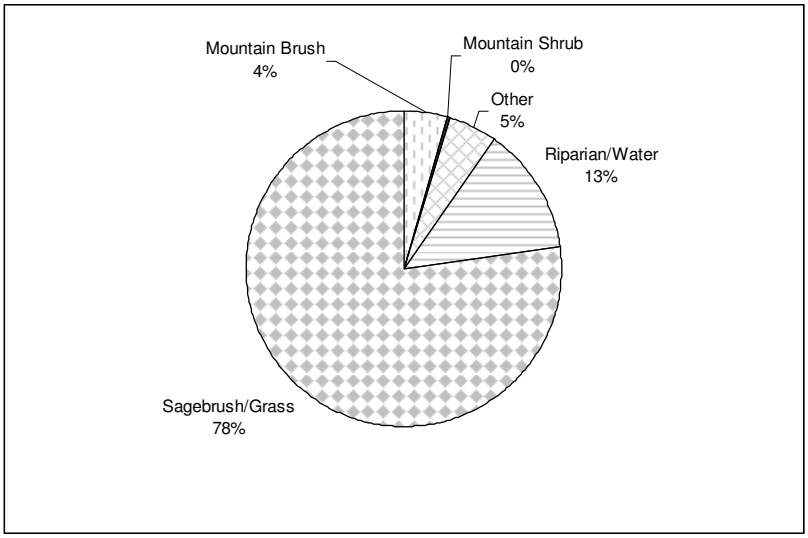


Figure 1.5-3: Non-Forested Cover Types

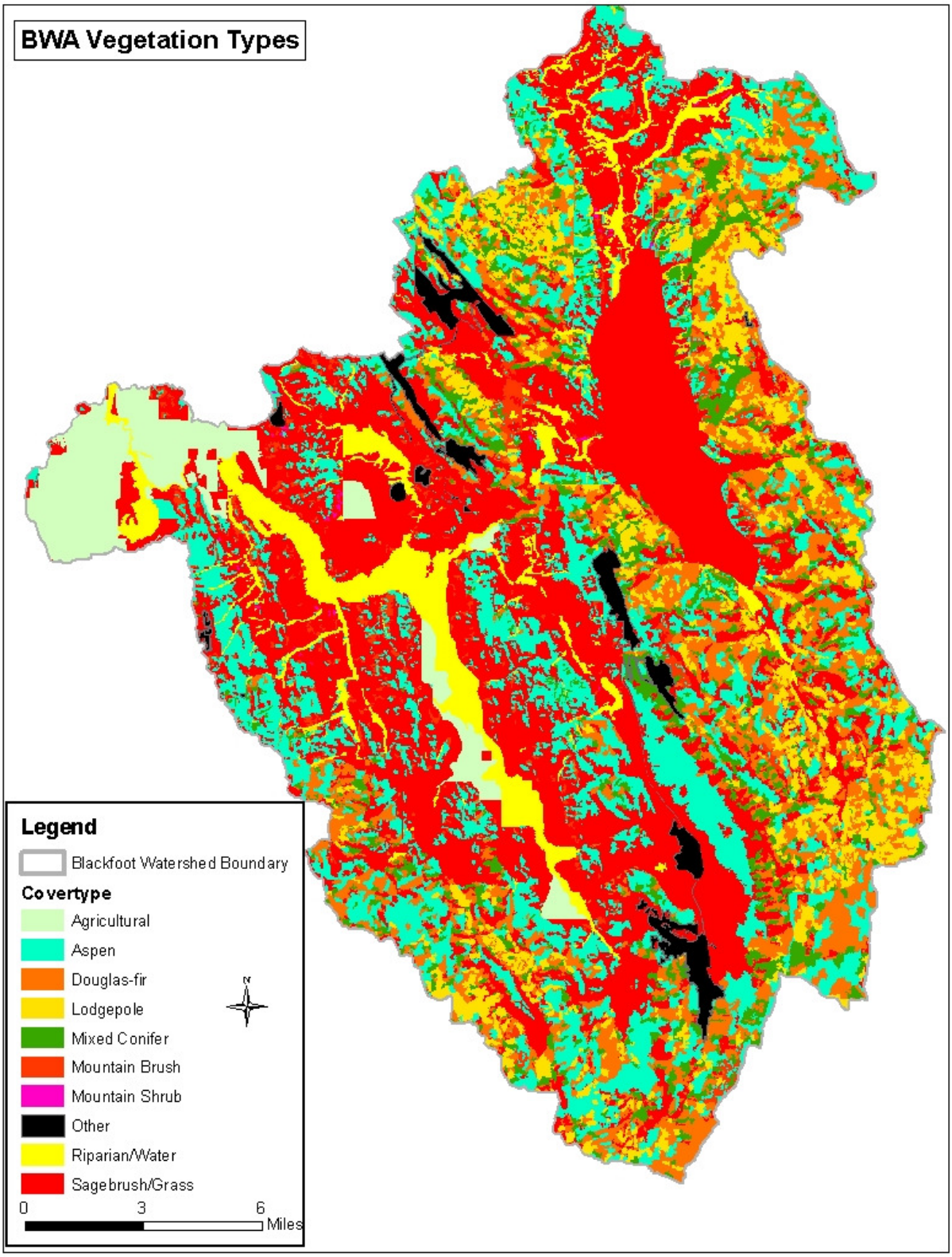
Table 1.5-3: Non-Forest cover types

Cover Type (% NFV)	Jurisdiction	Description
Sagebrush/ Grass (77%)	36% FS 64% Non FS	Areas that are currently dominated by sagebrush have been included in this type. Sagebrush is found on more acres than other species within the analysis area (more than 82,276 acres or over 37%). This type is dominated by the presence of big sagebrush however many sagebrush taxa may be represented. This type may have a variety of other brush species represented but they will generally represent less than 5% of the canopy cover. This type generally has an associated herbaceous layer of perennial grasses and forbs in varying amounts. Grass and forb species composition is strongly influences by physical and chemical soil characteristics and by grazing pressure.
Riparian/ Water (15%)	4% FS 96% Non FS	Areas that currently are dominated by riparian species or water have been included in this type. This type includes a wide range of riparian types from wetland vegetation to patches of willows. Most of the riparian cover type is associated with stream channels.
Other (5%)	91% FS 1% Non FS	Areas included in this type are dominated by bedrock, boulder fields, talus slopes or exposed dirt. Active Phosphate mine areas are also combined with this class.
Mountain Brush (4%)	33% FS 67% Non FS	Areas that currently have one or more of the mountain brush species representing over 5 % of cover have been included in this type. The mountain brush type is found intermingled with sagebrush at mid elevations and conifer/aspen forests at higher elevations. Mountain brush species are: chokecherry, serviceberry, rose, mountain snowberry, elderberry and ceanothus. These species may occur alone and form rather distinct types or may have mixed composition. These species generally sprout after fire and normally occupy slightly moister areas than sagebrush. However, sagebrush and bitterbrush are also often represented. This type generally has an associated herbaceous layer of perennial grasses and forbs in varying amounts. Grass and forb species composition is strongly influences by physical and chemical soil characteristics and by grazing pressure.
Mountain Shrub (<1%)	0% FS 100% Non FS	Areas included in this type are currently dominated by curlleaf mountain mahogany, rocky mountain juniper or bigtooth maple. This type covers a broad ecological spectrum from moderate to deep well drained soils to shallow rocky soils on ridge tops and southerly exposures. This type could be considered the transitional type. It represents what grows where it is to hash for trees and not suited for sagebrush. Curlleaf mountain mahogany is the only mahogany found in the assessment area it is a hardwood evergreen with tree like from. Rocky mountain juniper is the dominant juniper species found within the assessment area, it is a shrubby tree with scale-like evergreen leaves.

FS = Forest Service

The Caribou National Forest Sub Regional Properly Functioning Condition (PFC) Assessment states that at the sub-regional scale the riparian/wetland, mountain shrub and sagebrush types are at high to moderate risk and that mountain brush is at low risk. The PFC document looked at structure, composition and disturbance regime to develop the ratings.

Figure 1.5-4: Vegetation Types for Upper Blackfoot Watershed area.



Disturbance Agents

Fire

Fire has been a frequent visitor in the UBW, either as localized spot fires or as large, expansive conflagrations. Barrett (1994) documented several major fire years throughout the Caribou National Forest in 1745, 1781, 1844, and 1934. Since the 1970, over 28 fires (2,496 acres) have been suppressed within the analysis area, which equates to <1 wildfire per year. The results of fire suppression and historical grazing practices have had an impact on forested and non-forested community types. The lack of fire has resulted in two primary changes. First, it has resulted in an increased incidence of large fuel accumulations. Secondly, it has caused modification of vegetation structure and composition.

Fire has been the dominant historic disturbance that has determined the age and mix of species within the watershed. A mix of non-lethal and lethal fires controlled vegetation distribution prior to European settlement. The absence of fire, over the last 150 years has altered the patterns and species mix within vegetation types. Succession toward late seral or climax species has resulted from the lack of natural fire.

Insect and disease

Insects and disease have also played a role in shaping vegetation composition and structure. Insects that have played a role include mountain pine beetle, Douglas-fir bark beetle, spruce budworm, and fir engraver. The effects of these insects can range from small pockets of mortality to large epidemics that cover large areas. The diseases that exist include mistletoe, various rusts and root diseases, and many forms of cankers. The effects of these diseases tend to be limited in scope, effecting growth more than causing mortality, but where likely important in shaping fire intensity and severity.

1.6 Fisheries and Aquatic Habitat

The Blackfoot River is a major tributary to the Snake River in southeastern Idaho. It is approximately 200 km in length and drains approximately 283,290 ha (NRCS 2007). The watershed is bordered by Willow Creek watershed to the north, Salt River watershed to the east, Bear Lake watershed to the south, and Middle Bear River, Portneuf River, and American Falls watersheds to the west. The watershed is confined by the Chesterfield Mountain Range to the west and the Wooley, Grays, and Webster ranges to the east (Fischer 2002). Within the whole Blackfoot River darinage, there are approximately 1,097 km of perennial stream channels and 1,503 km of intermittent streams (Environmental Statistics Group 2003).

The soils in the central elevation of the watershed are generally highly erodable as is evidenced by frequent eroding river and stream banks in the lower watershed (Drewes 1987). The erodability of the lower river channel (downstream of Blackfoot Dam) was exacerbated by river channelization and levee construction by private individuals and the U.S. Army Corps of Engineers in the late 1950's and early 1960's (U.S. Army Corps of Engineers 1998). Bank instability in that area of the watershed is also perpetuated by intensive streamside livestock use in some areas (IDEQ 2001).

For the fisheries section of the analysis, the Upper Blackfoot Watershed Analysis area includes the Lanes-Diamond Creek and Upper Blackfoot River HUCs and Blackfoot Reservoir. The Lanes-Diamond Creek HUC includes Lanes, Sheep, Daves, Olsen, Chippy, Lander, Corrailsen, Browns, Bacon, Diamond, Timothy, Cabin, Yellowjacket, Terrace, Coyote, Bear, Timber, Stewart, Hornet, Campbell, Kendall, and Mill creeks. The Upper Blackfoot River HUC includes Angus, Mill, Trail, Slug, Johnson, Cold Spring, Dry, and Goodhart creeks.

The Blackfoot River fish community consists of native and non-native fish. Native fish include Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), mountain whitefish (*Prosopium williamsoni*), Utah chub (*Gila atraria*), longnose dace (*Rhinichthys cataractae*), speckled dace (*Rhinichthys osculus*), redside shiner (*Richardsonius balteatus*), Utah sucker (*Catostomus ardens*), mountain sucker (*Catostomus platyrhynchus*), bluehead sucker (*Catostomus discobolus*), mottled sculpin (*Cottus bairdi*), leatherside chub (*Lepedomeda copei*), and Piute sculpin (*Cottus beldingi*). Non-native fish include rainbow trout (*O. mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), black bullhead (*Ictalurus melas*), fathead minnow (*Pimephales promelas*), and carp (*Cyprinus carpio*) (IDEQ 2001).

The watershed is within the range of Yellowstone cutthroat trout, a Regional Forester Sensitive Species. There are 13 Sixth Code HUCs (older delineation that has changed) on the Forest within the analysis area as shown in **Error! Reference source not found.**. Of those HUCs, 7 are considered Yellowstone cutthroat trout strongholds, 4 have depressed populations of YCT, and 2 are considered historic range, but no YCT were observed there in recent efforts. Non-native fish such as brook trout and rainbow trout have been introduced into the analysis area. In some streams they are competing against them for aquatic habitat and resources.

Migratory and resident life history patterns of Yellowstone cutthroat trout occur in the analysis area. While resident fish spend their entire lives within a particular length of stream, migratory fish may travel great distances to spawn. Many migratory fish use Blackfoot Reservoir for at least part of the year, prior to migrating upstream to spawn. Prior to the construction of Blackfoot Dam, those fish would have likely migrated to the Snake River. Irrigation practices, primarily downstream of the Forest boundary, may have decreased the connectivity between streams in the analysis area and may have contributed to a decrease in YCT populations through entrainment and mortality in fields.

Map 2 Appendix A depicts the distribution of Yellowstone cutthroat trout stronghold populations on the Caribou half of the Caribou-Targhee National Forest. Watersheds where stronghold populations occur are colored green. Populations with moderate strength are in orange. The analysis area incorporates some of the most southern populations of Yellowstone cutthroat trout in their range. The immediate concentration of strongholds extends from the Blackfoot and Salt Drainages north to the tributaries that drain directly into the South Fork Snake River and Palisades Reservoir.

Northern leathersides have been historically documented in Angus Creek but have not been recently collected in the watershed. The reason for this is unclear but information in this analysis may provide some insight. Leathersides are small non-game fish that have been documented in the upper Snake and Bear River systems. Taxonomists have recently divided leathersides into the northern and southern

subspecies. Northern leathersides exist in the lower Bear River (western Wyoming, northern Utah, and southern Idaho). They are currently considered by the State of Idaho as a Species of Concern.

Resource use has had its impacts upon the physical characteristics of the Blackfoot River and its tributaries. While grazing, road building/maintenance, ranching, logging, and mining have affected streams in the upper watershed, agriculture and water use affected the river in the lower watershed. Land use within the analysis area is diverse and sometimes intense. Land use practices that have had impacts upon aquatic and riparian biota and habitat within the analysis area include grazing, mining, road and trail building/maintenance, irrigating, motorized recreation, dispersed camping, and logging. These land uses within the analysis area have affected aquatic and riparian biota and their habitat.

1.7 Wildlife and Rare Plants

The Upper Blackfoot Watershed provides a variety of habitat between 6,100 feet where the Blackfoot River enters the Blackfoot Reservoir to Draney Pear at 9,131 feet. The lower elevation valley bottoms are dominated by private land with scattered sections of BLM and State Lands. Most of the mid-slope and higher elevation is National Forest System lands (Caribou National Forest - CNF) administered by the Caribou-Targhee National Forest, Soda Springs and Montpelier Ranger Districts. Habitats can be broadly classified as urban, industrial, agricultural, forested, rangeland, or riparian/wetland. Species occurrence is based on suitable habitat, including lack of human disturbance or direct or indirect human caused mortality. Winter conditions, reducing forage quality and quantity, can determine occurrence and population levels of elk and deer. The habitat conditions off forest can influence occupancy of migrating wildlife on the forest; specifically birds, big game (elk and deer), and carnivores (wolves, lynx, and wolverines).

The Endangered Species Act (1973), National Forest Management Act (NFMA), Caribou National Forest Revised Forest Plan Standards and Guidelines (CNF RFP S&G), Migratory Bird Treaty Act (MBTA) and Executive Order 13186 are the most important laws and regulations providing regulatory constraints for wildlife and rare plant species found on the Caribou National Forest. Wildlife and rare plant species and habitats found on the Caribou NF are discussed in the Blackfoot Watershed Assessment unless suitable habitat or species occurrence is not expected. The Species and Habitats are grouped by categories mentioned above and listed in **Table 1.7-1** (IDFG et al. 2005).

Threatened, Endangered, Sensitive and Management Indicator Species

The Canada lynx (*Lynx canadensis*) and gray wolf (*Canis lupus*) are the only threatened, endangered, or proposed species listed under the Endangered Species Act that may occur in the Blackfoot River Watershed (USDI 2008).

The Upper Blackfoot River Watershed provides habitat for several sensitive species identified by the Forest Service Intermountain Region for the Caribou NF (USDA 2004), three of which are Management Indicator Species (MIS)* identified in the Caribou National Forest Revised Forest Plan (CNF RFP) (USDA 2003a & 2003b). The species that may occur or are expected to be found in the watershed are: Townsend's (Western) big-eared bat *Corynorhinus townsendii pallescens,* pygmy rabbit *Brachylagus idahoensis,* North American wolverine *Gulo gulo (luscus),* bald eagle *Haliaeetus*

leucocephalus, northern goshawk *Accipiter gentiles*,* Columbian sharp-tailed grouse *Tympanuchus phasianellus columbianus*,* greater sage-grouse *Centrocercus urophasianus*,* great gray owl *Strix nebulosa,* flammulated owl *Otus flammeolus,* Boreal Owl *Aegolius funereus,* three-toed woodpecker *Picoides tridactylus.* The watershed is outside the expected range or does not provide suitable habitat for the remaining sensitive species identified for the Caribou NF: spotted bat *Euderma maculatum,* peregrine falcon *Falco peregrinus anatum*, Trumpeter Swan *Cygnus buccinator,* Harlequin Duck *Histrionicus histrionicus,* Columbia spotted frog *Rana luteiventris,* Starveling Milkvetch *Astragalus jejunus* var. *jejunus,* Cache Beardtongue (Cache penstemon) *Penstemon compactus,* and Payson's Bladderpod *Lesquerella paysonii.*

Other species or groups of interest

The CNF RFP provides direction for the following species or groups of interest that may occur in the watershed: Animal Damage Management, Dead and Down Material, Snag and Cavity Nesting Habitat, Amphibians (Western [Boreal] Toads and Northern Leopard Frogs), Big Game (elk, mule deer, and moose), Winter Range (prescription areas 2.7.1 or 2.7.2), Landbirds, and Idaho sedge (*Carex idahoa* (sym:*Carex parryana* ssp. *idahoa*)). However suitable habitats for: green spleenwort (*Asplenium viride*), Red glasswort (*Salicornia rubra*), Rydberg's musineon (*Musineon lineare*), and Uinta Basin Crypthantha (*Cryptantha breviflora*) are not expected in the Blackfoot Watershed.

All birds in Idaho are protected except starlings, English sparrows and feral pigeons. The Migratory Bird Treaty Act (MBTA), Executive Order 13186 (Clinton 2001) and the Coordinated Implementation Plan for Bird Conservation in Idaho (Idaho Bird Plan) (IWJV 2005) provide direction to Federal Agencies on protecting birds. Blackfoot Reservoir [an *identified* "Important Bird Area"] is home to one of two nesting colonies of American white pelicans in Idaho. American white pelican, protected by the MBTA and listed as a state Species of Greatest Conservation Need in Idaho, are foraging on Yellowstone cutthroat trout (another sensitive species) due to the low water levels in the reservoir (IDFG 2007a).

Idaho Department of Fish and Game (IDFG 2007b) Blackfoot River Wildlife Management Area (WMA) is in the Watershed. Diamond Creek, an Idaho Wildlife Viewing Area and beaver (*Castor canadensis*), important for riparian habitat, are found in the watershed. Diamond Creek, Blackfoot WMA, and Blackfoot Reservoir are Idaho Birding Trails (IDFG 2007c) located in the watershed.

Table 1.7-1: Wildlife and Rare Plant Species and Habitats found on the Caribou National Forest that is expected in the Upper Blackfoot Watershed Assessment

Wildlife and Rare Plant Species and Habitats found on the Caribou NF	In WA
Threatened, Endangered, Proposed, and Candidate Species	**In WA**
Canada lynx *Lynx canadensis* Listed – Threatened	Yes
Sensitive Species (and MIS*) in the CNF RFP	**In WA**
Spotted Bat *Euderma maculatum*	No
Gray wolf *Canis lupus*	Yes
Townsend's (Western) Big-eared Bat *Corynorhinus townsendii pallescens*	Yes
Pygmy rabbit *Brachylagus idahoensis*	No
North American wolverine *Gulo gulo(luscus)*	Yes

Wildlife and Rare Plant Species and Habitats found on the Caribou NF	In WA
Trumpeter swan *Cygnus buccinator*	No
Harlequin duck *Histrionicus histrionicus*	No
Peregrine falcon *Falco peregrinus anatum*	No
Bald eagle *Haliaeetus leucocephalus*	Yes
Northern goshawk *Accipiter gentiles**	Yes
Columbian Sharp-tailed grouse *Tympanuchus phasianellus columbianus**	Yes
Greater sage-grouse *Centrocercus urophasianus**	Yes
Great gray owl *Strix nebulosa*	Yes
Flammulated owl *Otus flammeolus*	Yes
Boreal owl *Aegolius funereus*	Yes
Three-toed woodpecker *Picoides tridactylus*	Yes
Columbia spotted frog *Rana luteiventris*	No
Starveling milkvetch *Astragalus jejunus* var. *jejunus*	No
Cache beardtongue (Cache penstemon) *Penstemon compactus*	No
Payson' bladderpod *Lesquerella paysonii*	No
Other Species or groups of interest (CNF RFP)	**In WA**
Animal Damage Management	Yes
Dead and Down Material, Snag / Cavity Nesting Habitat	Yes
Amphibians: Western (boreal) toads and northern leopard frogs	Yes
Big Game (elk, mule deer, and moose), Winter Range (Rx areas 2.7.1 or 2.7.2)	Yes
Landbirds, Migratory Bird Treaty Act, Executive Order 13186, and "Idaho Bird Plan"	Yes
Green spleenwort (*Asplenium viride*)	No
Idaho sedge (*Carex idahoa* (sym:*Carex parryana* ssp. *idahoa*))	Yes
Red glasswort (*Salicornia rubra*)	No
Rydberg's musineon (*Musineon lineare*)	No
Uinta Basin Crypthantha (*Cryptantha breviflora*)	No
Other local Wildlife Species, Areas, and Issues	**In WA**
Beaver (*Castor canadensis*)	Yes
American white pelicans *Pelecanus erythrorhynchos*	Yes
Designated Wildlife Areas Idaho Birding Trails: Diamond Creek Blackfoot Wildlife Management Area (WMA) Blackfoot Reservoir Diamond Creek Wildlife Viewing Area in Idaho Blackfoot Wildlife Management Area, Idaho Department of Fish and Game Blackfoot Reservoir Important Bird Area, *Identified*	Yes
Selenium Contamination	Yes

1.8 Human Uses

Historic and existing human use patterns influence the appearance, condition, and management opportunities within the watershed. Land use within the analysis area is diverse and sometimes intense. Land use practices that have had resource impacts within the analysis area include grazing, mining, road and trail building/maintenance, irrigating, motorized recreation, dispersed camping, and logging.

Phosphate Mining

Rocks present in the Upper Blackfoot Watershed include marine sediments deposited during the Permian period (265 million years ago) along the western margin of the North American continent. These marine sediments include the phosphate-rich ore zones of the Meade Peak member of the Phosphoria formation. A low-grade phosphatic shale layer called the Center Waste Shale is sandwiched between the two primary high-grade phosphorite ore zones. The low-grade shales, along with the other sedimentary rock units that overlie the ore zones, are removed during mining and placed in waste rock storage piles. Southeast Idaho contains one of the richest deposits of phosphate ore in the world and supplies about 15% of the total phosphorus consumed in the U.S., which is used in fertilizers, herbicides, food additives and other commodities.

Phosphate ore was discovered in southeastern Idaho in the late 1800s. However, commercial mining ventures initially lacked the necessary transportation infrastructure to deliver the ore to fertilizer manufacturers. Phosphate mining in Idaho began in 1903 and in the Blackfoot River Watershed (BRW) in 1910 at the Conda Mine, 8 miles north of the current townsite of Soda Springs.

Waste rock piles from phosphate mining typically contain potentially hazardous trace elements such as selenium. Selenium can be mobilized into the environment by plant uptake, by erosional processes in soil, and by leaching through contact with precipitation and surface water and then by transportation into the groundwater.

Other Mineral Resources

Mineral materials (sand, gravel, stone, etc.) have been produced from the area in relatively small quantities (except in connection with phosphate mining facilities and infrastructure). A few known sources of road surfacing material are present in the area, and will probably continue to be used if/when needed. The phosphate mines generally use overburden material generated during mining operations for their needs. New, presently undeveloped, sources are probably present as well, but have not been located and evaluated.

Rock suitable for personal use landscaping purposes may also be present in the watershed analysis area, but only limited use of this resource has been made to date. There may be areas in the watershed where landscaping rock sources could be developed. A search could be conducted for such a source and an assessment as to its usefulness could be made.

Oil and gas

The Wyoming Thrust Belt has produced large quantities of oil and natural gas in adjacent parts of western Wyoming and northern Utah, but none yet in Idaho. Some of the more favorable conditions needed for the creation and accumulation for oil and/or natural gas are apparently not present or not as well developed in the Idaho portion of the belt. High subsurface temperatures in the area also affect the potential for the presence/preservation of hydrocarbons.

Three exploratory oil/gas wells have been drilled in the watershed, in 1952, 1979, and 1980 (Breckenridge, 1982); all were plugged and abandoned after drilling, indicating that insufficient (or no) hydrocarbons were discovered to justify the expense of development. There are no existing oil/gas leases on NFS lands within the watershed, nor have there been any in at least the last 15 years (Robison, 2006a).

Geothermal resources

There has been a general interest in southeast Idaho concerning geothermal resources. However, there are no hot/warm springs documented on NFS lands within the watershed. The Henry Warm Spring located on the eastern shore of Blackfoot Reservoir has a reported temperature of 86 degrees Fahrenheit. There are two other warm springs located on the northeast side of the reservoir, with about the same temperatures (US Dept. of Energy, 1980). These temperatures are too low for direct steam electrical energy generation, but could have indirect heating/recreational values. Higher temperatures are probably present at depth in the watershed analysis area. However, inadequate near-surface temperatures, probable high cost of drilling deeper wells, general lack of infrastructure to develop this potential energy source, and other conditions make the potential for the development of geothermal resources for generation of electricity unlikely in the watershed in foreseeable future. There are no existing geothermal leases on NFS lands in the watershed.

Locatable Minerals

Mining claims, located on relatively pure limestone, were once present in the general area, but those claims have since been closed by the BLM. Sufficient limestone is present elsewhere in the area to supply existing demand. No other locatable minerals have been produced in the watershed, and it is very doubtful that any will be because the geology is not indicative or favorable for the presence of locatable mineral deposits (exclusive of the limestone). There are no active mining claims for any mineral commodity in the watershed at present (BLM, LR 2000 database as of January, 2008).

Livestock Grazing

Grazing by ungulates in the Blackfoot watershed probably first occurred when Indians hunted and camped in the area with their horses. Grazing by domestic cattle and sheep first occurred in the late 1800's.

Early settlers herded their livestock to this area as soon as snow left and allowed them to simply follow the receding snowline to higher elevations. Early managers in the Forest Service recognized problems created by past levels of grazing and initiated corrective actions. Grazing seasons were gradually shortened as range-readiness data was collected. Until approximately 1940, the authorized period of use was from early to mid May through mid to late October. Current use occurs from mid to late June through late August to mid September. Reductions in livestock numbers prior to 1940 were minor

with more significant reductions occurring after 1940. Early records indicate some areas were considered to be "exclusive" cattle range and others exclusive sheep range, but use by both kinds of livestock on the same ranges was common. The Forest Service negotiated boundary changes and established separate allotments for each kind of livestock. The practice of "common use" or "dual use" was essentially terminated in the late 1960's. .

Grazing the same area many times in a single season is another practice that was recognized as a problem in the late 1950's. Allotment management plans written in the 1960's commonly stated that every inch of the forage was grazed at least once and was often grazed several times in a single season. Re-grazing areas, along with dual use and over-stocking, left much of the range in fair to poor condition. By reducing livestock numbers and season of use in the 1940's, and by eliminating "common use grazing" in the 1960's, the Blackfoot River watershed area has undergone a significant reduction in grazing use. Grazing use within the watershed has been reduced by more than 60 percent over the past 100 years

To help improve rangeland condition and to better manage livestock within the area management systems were implemented in the early 1960's. Many of the Allotment Management Plans implemented rest-rotation systems. These systems required the use of a full-time herder to regulate the movement of sheep during the grazing season. Having a herder to move the sheep helped reduce problems of sheep bedding in the same location night after night. The allotment management plans of the 1960's sheep limited to bedding in a single area for a maximum of three nights.

Records show that significant efforts were made to develop alternative water sources in the 1960's. By developing water sources at various locations it was easier to keep cattle and sheep properly distributed and thus it was easier to obtain uniform use of the rangelands. The developing of alternative water sources has proved effective in eliminating, or reducing heavy grazing use in the riparian areas, and making it possible for livestock to use areas typically not grazed.

Roads

Transportation facilities (roads, bridges, and culverts) in the Upper Blackfoot Watershed provide important access for a variety of uses including recreation, ranching, timber harvest, and mining. The current system is very developed with a combination of planned and unplanned roads. The majority of the planned roads have been constructed for commercial access for grazing, timber, and mineral activities. Refer to Map 2 in Appendix A.

On the forest, the roads are categorized as arterial, collector and local. There is also a category of special use roads to provide access for the phosphate mines.

The arterial system is well developed and provides primary access to all of the major drainages with many of these primary access roads under county jurisdiction. These roads are generally graveled and receive annual maintenance. These roads include the Blackfoot River Road, Upper Valley Road, Diamond Creek Road, Timber Creek Road, Dry Valley Road, Trail Canyon Road, Wood Canyon Road, and Slug Creek Road. These roads provide connectivity to the major transportation routes outside of the watershed including State and Federal Highways and county roads.

There is also a well developed system of collector roads. These roads provide access to large areas and branch off of the primary arterial routes. Many of these roads are also graveled and receive annual maintenance. These roads include the Flat Valley Road, Diamond Bench Road, Dave's Creek Road, Rasmussen Valley Road, and Harrington Peak Road.

There are numerous local roads many of which are native surfaced. Some of these roads were constructed for single purpose access and are managed as closed.

With the phosphate mining activity in the watershed there are also several special use haul roads. These roads can be up to 100 feet wide and have a graveled surface. These roads are associated with the Long Valley Mine, the Rasmussen Ridge Mines, the Dry Valley Mine, the Mountain Fuel Mine and the Maybe Canyon Mines. In additional, there are many temporary local roads within the mine development.

A forest wide roads analysis was performed on the Caribou NF in 2002 which verified the need for the key road system. An additional forest wide roads analysis was completed to inform the 2005 Revised Caribou NF Travel Plan in which all of the roads on the forest within the watershed were evaluated as to their need and environmental effects. A roads analysis is completed for the watershed and is located in appendix B.

Recreation Activities

The drainages that encompass the Blackfoot River system on the Soda Springs Ranger provide prime opportunity for dispersed recreation experiences. Generally the type of recreationist attracted to the area is oriented towards motorized travel and camping in multiple groups during hunting season.

Hunting

Big game hunting is popular during the fall months with hunters on horseback in the non motorized areas and motorized hunting on designated routes within Idaho Fish and Game unit 76. Hunting begins in late August with archery season and generally ends in mid November following the cow elk rifle hunt. The area has one Outfitter and Guide.

Camping

The majority of campers come from the surrounding counties to enjoy weekend stays on the Forest. During the start of big game hunting season demographics change generally it is difficult to find camping spots during weekends from August to the end of October.

Snowmobiling

Snow machining dominates winter activities in the analysis area, primarily along the looped groomed trail system from Trail Canyon to Slug Creek that is part of a larger trail system from starting from Lefthand Fork of Georgetown. The area provides intermediate to challenging off trail riding for experienced snowmobilers who enjoy un-groomed terrain.

Non-Motorized Travel

Horseback riding, mountain biking and hiking occur in incidental amounts with the exception of big game hunting on foot and horseback during the fall season.

Motorized Travel

The analysis has about 273 miles of roads and trails open to motorized use. The majority of the routes are secondary high clearance vehicle roads that are open to ATV's. About 94 miles are designated as ATV routes for vehicles 50 inches or less.

During the late 1980's and early 1990's ATV's were not viewed as a problem that caused resource damage on the District. The Forest was open to cross country ATV travel prior to the completion of the Travel Management Plan in 2005. Riders would commonly construct illegal trails to get to hunting spots or in some cases organize work groups to clear trails for general recreation

Other Recreation Activities

Sight seeing, berry picking, big game watching and fishing also occur in the Blackfoot analysis area.